CLAIMS

We claim:

1. A method of monitoring a condition of a load bearing member in an elevator system, comprising the steps of:

applying a first signal having a first characteristic to at least one tension member in the load bearing member;

applying a second signal having a second, different characteristic to at least one tension member in the load bearing member;

determining a wear condition of the load bearing member based upon a response to the first signal; and

determining a failure condition of the load bearing member based upon a response to the second signal.

2. The method of claim 1, wherein the first and second characteristics are a frequency and the second frequency is higher than the first frequency.

3. The method of claim 2, wherein the first signal has a first amplitude and the second signal has a second, lower amplitude.

4. The method of claim 2, wherein the first signal comprises a series of pulses having a first duration and the second signal comprises a series of pulses having a second, shorter duration.

5. The method of claim 2, including determining a use condition of the elevator system and increasing the second frequency during periods of higher use.

6. The method of claim 2, including increasing the second frequency if the response to the first signal indicates an increased wear condition.

7. The method of claim 1, wherein the signals each comprise a series of pulses and including synchronizing the signals such that the first signal pulses are not on at the same time as the second signal pulses.

8. The method of claim 1, including determining that a failure condition of the load bearing member exists only when a selected number of tension members provide a response to the second signal indicative of failure.

9. The method of claim 1, including applying the first and second signals, respectively, to a plurality of tension members and determining an individual response of each of the tension members to the signals.

10. The method of claim 1, including periodically determining the wear condition by monitoring the response to the first signal over an extended time and determining the failure condition by continuously monitoring the response to the second signal.

11. A device for monitoring a condition of a load bearing member in an elevator system, comprising:

a controller that applies a first signal having a first characteristic to at least one tension member in the load bearing member and applies a second signal having a second, different characteristic to at least one tension member in the load bearing member, the controller determines a wear condition of the load bearing member based upon a response to the first signal and determines a failure condition of the load bearing member based upon a response to the second signal.

12. The device of claim 11, wherein the signals each comprise a series of pulses and the controller synchronizes the signals such that the first signal pulses are not on at the same time as the second signal pulses.

13. The device of claim 11, wherein the first signal comprises a series of pulses having a first duration and the second signal comprises a series of pulses having a second, shorter duration.

14. The device of claim 11, wherein the first characteristic is a first frequency and the second characteristic is a second, higher frequency.

15. The device of claim 14, wherein the first signal has a first amplitude and the second signal has a second, lower amplitude.

16. The device of claim 14, wherein the controller determines a use condition of the elevator system and increases the second frequency when the elevator system use exceeds a selected threshold.

17. The device of claim 14, wherein the controller increases the second frequency if the response to the first signal indicates an increased wear condition.

18. The device of claim 11, wherein the controller integrates the response to the first signal over time to make the wear condition determination and continuously monitors the response to the second signal to instantaneously make the failure condition determination.

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19. An elevator load bearing member assembly, comprising:

a plurality of electrically conductive tension members;

a non-conductive coating over the tension members; and

a controller electrically coupled with at least one of the tension members, the controller applying a first signal having a first characteristic to at least one tension member in the load bearing member and applying a second signal having a second, different characteristic to the tension member, the controller determining a wear condition of the load bearing member based upon a response to the first signal and determining a failure condition of the load bearing member based upon a response to the second signal.

20. The assembly of claim 19, wherein the first characteristic is a first frequency and the second characteristic is a second, higher frequency.